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netic, rather than in all directions, or even in only two directions. "I maintain . . . that mutation is not a special kind of variability . . . but it is a part of the normal variability, and the direct response of the germ plasm to stimuli." While these experiments and the conclusions of the author thus seem out of harmony with the views of mutationists, small comfort can be obtained on the other hand by Neo-Lamarckians, for there seems to be no evidence in favor of the notion of the transmission of variations that are found to arise in the soma. Even if such variations are first visible in the soma, they are possible only when the germ plasm has developed a soma capable of variation. The botanists seem to have more generally accepted the theory of mutation than have the zoologists. It scarcely seems possible that one method has been uniformly effective in animal evolution and another as uniformly in plant evolution. Very likely nature has been more multifiform in her methods than most of us have yet been willing to believe.—HENRY C. COWLES.

Vegetable physiology

A new edition of GREEN'S *Vegetable physiology* has just made its appearance from an American press.³ Unfortunately the author has not written any preface to the new edition and so what changes he has made can be ascertained only by laborious comparison of the new with the old. The alterations are more numerous than extensive, and it is evident that in large part the old plates are used. Yet the changes suffice for the incorporation of the more important recent advances in the science.

One of the most striking improvements is the transfer of the chapter on respiration from its former connection with the chapter on the aeration of plants to the chapter on the energy of the plant, so that it follows instead of precedes the discussion of food-making and food-getting, digestion, translocation, and storage. The topic might have received more thorough revision in its text to advantage. Other changes are noticeable in the discussion of the absorption of food materials, the chlorophyll apparatus, photosynthesis, and in the nomenclature and classification of proteids.

Not all of the slips have been eliminated in the revision, but the improvement is obvious in bringing the book more nearly up to date. The most striking defects which caught our attention are the retention of the filter theory of dialysis (at least by inference, for the explanation of osmosis is not very clear) and the statement that etiolin is converted into chlorophyll by the action of light. All the recent evidence is against both of these conceptions.

Of all parts of the book the chapters on irritability seem to us most in need of thorough reworking, but this has not been done. Perhaps the author was not free to make changes that would involve extensive resetting of type; as to this he does not take us into his confidence. By and large the book is one of the

³ GREEN, J. REYNOLDS, An introduction to vegetable physiology. Second edition. 8vo. pp. xx+459. Philadelphia: P. Blakiston's Son & Co. 1907. \$3.00.

best brief texts in English that are available for elementary students. Its issue by an American house will make it much more accessible for American students.—C. R. B.

MINOR NOTICES

The vegetation of Texas.—BRAY⁴ has made a presentation in a most attractive booklet of the various ecological features of the Texas vegetation. The style of the work is popular, inasmuch as the design of the author was to make the general features of the vegetation of the state a matter of interest to students in the schools and citizens generally. First the factors of plant environment are considered, detailed application being made to the familiar plants of the state. Next follows an account of the plant societies, treated chiefly after the order of SCHIMPER. It is here especially that one may see the astonishing variety that is to be found in Texas. The woodlands range from the fine bottomland and pine forests of the southeast, through post-oak or live-oak forests to the western chaparral. Again in the mountains the characteristic conifer forests of the Rocky Mountains are to be found. There are also extensive areas of prairie and desert. Last of all is considered the vegetation of the water, halophytic areas, and dunes. It is probable that somewhere in Texas any citizen of the entire country (except the far west) could find familiar plant formations, so great is the variety. It is to be hoped that this most excellent work will be made of great use throughout the state. For the purpose it is probably the best work that any of our states possesses. There are some good maps, and a number of photographic representations of characteristic landscapes and vegetation types.—HENRY C. COWLES.

Ecological exploration in northern Michigan.—Few have recently done more to advance the frontier lines of ecology than has C. C. ADAMS,⁵ and it may be said that his report on the survey of parts of northern Michigan is the record of essentially pioneer work. This is probably the first paper to extend the principles of physiographic ecology to the biota of a region. It is obvious that the future must see much work of this character, for it is only by such studies as this, carried on by a number of ecological specialists, that the complex interrelations of any biota are to be worked out. There are three special ecological papers in this report. A. G. RUTHVEN, who had charge of the field-work, under the supervision of Mr. ADAMS, presents an account of the regions studied, the Porcupine Mountains and Isle Royale. The chief feature here is the detailed description of the representative stations that were chosen for study. In each case the characteristic plants and animals are noted, and the physiographic and ecological dynamics are elucidated. Papers follow on the ecological distribution of the birds of the

⁴ BRAY, W. L., *Distribution and adaptation of the vegetation of Texas*. Bull. Univ. Tex. 82; Scientific Series 10. pp. 108. Austin. 1906.

⁵ ADAMS, CHARLES C., *An ecological survey in northern Michigan*. From report of Michigan State Board of Geological Survey for 1905. pp. 133. Lansing. 1906.